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AN APPLICATION OF COST ACCOUNTING IN RATE-MAKING

Can the principles of cost accounting be applied consistently in the general field of transportation? This question has been asked may times in recent years, and it is assuming added interest now that the decisions both of the Supreme Court and of the Interstate Commerce Commission are tending strongly toward a separation of costs in the different lines of railway service. The complete solution of the problem is hardly to be expected at the present time, or perhaps even in the immediate future, but it is no exaggeration to say that two state investigations which have recently come to public notice represent at least a step in this direction. One of these is the Minnesota express rate case, concluded as early as 1910. The other is the Wisconsin express rate case,2 decided in May, 1913. The problem in these two cases was the same: to determine revenues and expenses in intrastate express business and from these to draw conclusions as to the reasonableness of local express rates. Both cases were based upon the cost principle, but, as will be seen, the cost principle was approached from different angles; and both gain their significance through the light they throw upon the possibilities of further application of this principle.

The Minnesota case followed throughout the so-called expenseunit method. In its essence it represented simply an effort to determine the expense of earning a dollar in intrastate express business and from this to deduce the reasonableness, or the unreasonableness, of the express rates in force in the state. Stated more broadly, the procedure was to determine the value of all property used in business assignable to the state, to apportion state revenues and state expenses, and to calculate the return on the investment.

¹ Minnesota Railroad and Warehouse Commission: State of Minnesota vs. Wells, Fargo & Co., Express.

² Railroad Commission of Wisconsin: Merchants' and Manufacturers' Association of Milwaukee vs. Wells, Fargo & Co. et al.

The significance of this case lies chiefly in its contribution to the methods of determining state revenues and state expenses in the express business. The railroad side of express transactions was introduced only incidentally, and somewhat superficially, to show that the percentage of gross earnings paid to the railroad company was unduly high. Moreover, the procedure in the case as a whole was open to three main objections, one of which at least is serious. These objections were: (1) the extensive use of estimates and apportionments when actual figures were available, (2) alleged inaccuracy arising in the translation of accounts from a monthly to a yearly basis, and (3) the inclusion in Minnesota revenues of earnings from business other than transportation conducted entirely outside of the state.

The Wisconsin case was based upon the cost-unit principle and represents in many ways the most consistent and far-reaching application of this principle that has yet been made in the practice of rate-making and rate-judging. The object here was to test the reasonableness of express rates in the state, not only by a comparison of revenues and expenses, but by a direct calculation of the actual cost of carrying a pound, or more conveniently a hundredweight, of express matter in the ordinary course of express business. This procedure involved, on the express side, a determination of the investment in Wisconsin business, an apportionment of revenues and expenses to the state, a division of the latter into intrastate, interstate, and transstate, and a computation of shipment costs, weight costs, and the express portion of movement costs. On the railroad side, it involved a determination of the railroad investment in the state, a division of the freight and passenger business on the whole line and a subdivision of the latter between the whole line and the state, a separation of passenger and express revenues and expenses, and a calculation of movement costs and the railroad portion of weight costs and shipment costs. From these calculations an effort was made to construct a schedule of rates running to the actual costs of the services performed and including allowance for taxes, working capital, and a return of 7 per cent on investment.

¹ For a full discussion of this case see the *Journal of Accountancy*, February, 1915, pp. 107-17.

The investigation in the case was made to cover the business of all the express companies operating in the state, but the calculations were based more specifically upon the operations of Wells, Fargo & Company and the Chicago, Milwaukee & St. Paul Railroad. Some of the difficulties which arose in the Minnesota case were avoided. The period chosen for consideration was the entire fiscal year ending June 30, 1910, direct allocations were made whenever reliable figures were available, and earnings from business other than transportation were included, in the main, only when they accrued within the state.

The chief purpose of the investigation was, of course, to determine the reasonableness of the express rates and the adequacy of the express service in the state of Wisconsin. Much of the material introduced into the case was devoted to this side of the subject. Interesting as this material is, and important as it is from the general standpoint of express rates and practices, it would seem best for present purposes to put it to one side and simply to trace through the application of the cost principle.

As the item of gross earnings figured in a number of the cost apportionments, the first important step in the computation was to determine the revenues, both express and railroad, attributable to the state and divisible between whole line and state, between state and intrastate, and between the different lines of transportation service. Applied to express revenues this consisted in a calculation of the Wisconsin portion of the earnings from all operations touching the state and a separation of these earnings on the basis of interstate and intrastate transactions. On the railroad side it consisted in a determination of freight and passenger earnings for the whole line, a determination of freight and passenger earnings in the state of Wisconsin, and a separation of passenger earnings into revenues derived from express operations and revenues derived from other sources—passenger traffic, mail, outside operations, etc. The separations in both cases were made mainly by means of direct allocations; that is, from the books and special reports of the companies, checked and tested by experts in the employ of the Commission. There were a few exceptions. the express business revenues from money orders, travelers' checks, and telegraphic transfers were divided between state and intrastate on the basis of previously allocated terminal expenses, and in the railroad business a few miscellaneous items were divided between the whole line and Wisconsin on an overhead basis.

A similar preliminary step was necessary in connection with the number of express waybills for the year ending June 30, 1910, the latter being used in separating several of the expense items in the express business and farther on in computing the number of shipment handlings. In order to determine the number of waybills an actual check of the various express agencies in the state was made for the months of June, July, and August, 1910, and the average charge per waybill thus ascertained was applied to the total charges for the year. The data in connection with other bases of apportionment were made up partly by independent calculations, but mainly from the reports of the companies concerned.

The great problem of the investigation, however, lay in the effort to find and apply these bases in an equitable way in apportioning expense accounts to the different lines of railway and express service. The details which this separation involved have been mentioned in a general way in a preceding paragraph. In effecting this division of accounts three main principles were taken as starting-points: (1) direct allocations were made whenever the nature of the accounts was such as to make these allocations possible; (2) accounts which fluctuated materially from year to year were made up from an average of the two years ending June 30, 1909, and June 30, 1910; (3) apportionments followed the general accounting principle that accounts incapable of direct allocation may be apportioned on the basis of the accounts to which they are most closely related.

On the express side the task presented no unusual difficulties. It consisted mainly in a consideration of the forty-eight primary items of expense and a division of the accounts, together with taxes and return on investment, between whole line and state and between state and intrastate. A number of these accounts were allocated directly and most of the rest were found to be capable of apportionment on such bases as revenues, overhead, and waybills. The extent to which direct allocations were made is indicated

by the fact that \$291,227.85 was so allocated out of a total operating cost in the state of \$377,435.14. In both the railroad and the express business accounts were occasionally separated partly by direct allocation and partly by apportionment.

On the railroad side the problem was more complex. Specifically the separation here involved the following calculations and apportionments: (a) freight and passenger expenses on the whole line; (b) operating expenses incident to express on the whole line; (c) freight and passenger operating expenses in Wisconsin; (d) operating expenses incident to express in Wisconsin; (e) operating expenses incident to intrastate express in Wisconsin; (f) taxes and return on investment. It is natural that in the separation of these accounts recourse should have been had more frequently to special calculations and to apportionments on a more or less arbitrary basis. When we consider, however, the complexity of the problems involved and the variety of the interests represented, the number of such apportionments seems remarkably small. Omitting the division of expenses between the whole line and Wisconsin, which was based upon figures furnished by the company and tested and approved by the representatives of the Commission, the great majority of the apportionments were made upon five main bases: (a) ton-miles; (b) overhead; (c) gross earnings; (d) revenue trainmiles; (e) car-miles. These bases were derived and applied in connection with the following controlling considerations: accounts varying with the amount of traffic were apportioned on the basis of ton-miles; (2) accounts which are independent of the amount of traffic, or which may be regarded as independent expenses belonging to several lines of service, were apportioned on the basis of gross earnings, the theory being that, laying aside the logical difficulty involved, each service should contribute to these expenses in proportion to its revenue; (3) certain accounts of a general nature were apportioned on an overhead basis. It is only fair to add that in the records of the investigation the reasons for each apportionment are fully and ably explained.

The story of the apportionments can best be read in Tables I and II. It is necessary, however, to warn the reader that these tables do not tell the whole story and that they should not be

TABLE

Wells, Fargo & Co.: Apportionment of Expenses

A. Operating Expenses

I. MAINTENANCE

1		
rn	4. Car S. Car Repairs Renewal	z. Superin- insy. Fix 3. Office tures and Equipment Repairs Renewals to Grounds Grounds
	Revenues	Wis-Overhead Valuation Overhead Revenues
		State and Intrastate Overhead Waybills † Waybills †

II. TRAFFIC

	15. Superin- tendence	16. Outside Agencies	1s. Superin- 16. Outside 17. Advertis- 18. Traffic 19. Stationery tendence Agencies ing Associations and Printing	18. Traffic Associations	19. Stationery and Printing	20. Other Expenses
Whole Line and Wisconsin Overhead to 15-20		Actual	Revenues	Revenues	Revenues	Revenues
State and Intrastate	Overhead to 15–20	Waybills	Revenues	Revenues	Revenues	Revenues

III. TRANSPORTATION

	21. Superin- tendence		22. Office 23. Commis- 24. Wagon sions Employees		25. Office Supplies and Expenses	26. Rent	27. Stable Employees	28. Stable Supplies and Expenses	29. Train Employees
consin	Whole Line and Wisconsin. Overhead to 22-30	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual‡
state and Intrastate	Overhead to 22–30	Waybills and actual	Waybills	Waybills	Waybills	Waybills	Waybills	Waybills	Ton-miles
		-							

	30. Train Supplies and Expenses	31. Transter Employees	(1)(1)	12. Transfer 33. Stationery 34. Loss and 55. Loss and 56. Damage to 37. Injuries to Expenses and Printing Freight Money Property Persons	34. Loss and Damage— Freight	35. Loss and Damage—Money	36. Damage to Property	37. Injuries to Persons	38. Other Expenses
Whole Line and Wisconsin	Overhead to 29	Actual	Actual	Overhead to 22–32	Revenues	Revenues	Overhead to 22-32	Overhead to 22–32	Overhead to 22-32
State and Intrastate	Ton-miles	Waybills	Waybills	Overhead to 22-32	Revenues	Revenues	Overhead to 22-32	Overhead to 22-32	Overhead to 22-32

IV. GENERAL

	41-48
Whole Line and Wisconsin	Overhead to 1-38
State and Intrastate	Overhead to 1–38

B. Taxes

Actual	Overhead to 1-38	
Whole Line and Wisconsin Actual	State and Intrastate Overhead to 1-38	

C. Return on Investment

Actual	Overhead to 1-38
Whole Line and Wisconsin	State and Intrastate

^{*} Average, 1909 and 1910.

[†] Accounts 2, 3, 8, 10, 16, 22, 23, 25, 26, 27, and 28 represent terminal expenses and were here apportioned en bloc.

[‡] And Wisconsin mileage.

made the basis of criticism on that account. Details have necessarily been omitted, and the tables have been inserted to indicate the trend of apportionments, rather than to show the actual apportionment in any specific instance.

The estimate of expenses included, as we have seen, taxes and a return of 7 per cent on investment. Taxes offered no particular difficulty, being computed directly from sums actually assessed and paid in. In determining the investment in the state, the Commission did not at this point enter upon the intricate problem of valuation. For the express company the valuation of physical property was taken at its cost, or inventory, value as derived from the tax commission reports for 1909 and 1910, and the balance of current assets and materials and supplies on hand were apportioned to the state on the basis of operating expenses. The value of the railroad property was based upon previous records of the Commission, and is described as "the cost of reproduction new of all operations in Wisconsin." These items were apportioned to the various lines of service on the basis of operating expenses.

From the foregoing calculations it was possible to ascertain the total express company costs and the total common carrier costs which arose in connection with express operations in Wisconsin. The specific figures were as follows:

Common carrier costs	
Total costs	\$695,576.00
Intrastate: Express company costs	\$185,573.17

 Common carrier costs
 87,300.00

 Total costs
 \$272,873.17

These figures disregard, of course, the claim of the express company that the 55 per cent of gross earnings paid for service rendered by the railroads should be included as a part of its costs. On this point, the Commission took the position that movement costs are evidently higher in interstate business, and that even granting that reasonableness of the payment for the company as a whole should

State:

¹ Opinion, p. 33.

I. Maintenance of Way and Structures

	1. Superin	2. Ba	ıllast*	3.	Ties	4. I
	tendence	1/8	7/8	1/5	4/5	9/10
Whole Line, Freight and Passenger	Overhead	Revenue train-miles	Gross earnings	Revenue train-miles	Gross earnings	Revenue train-miles
Whole Line, Passenger and Express	Overhead	Ton-miles	Gross earnings	Ton-miles	Gross earnings	Ton-miles
Whole Line and Wisconsin						
Wisconsin, Freight and Passenger	Overhead	Revenue train-miles	Gross earnings	Revenue train-miles	Gross earnings	Revenue train-miles
Wisconsin, Passenger and Express	Overhead	Ton-miles	Gross earnings	Ton-miles	Gross earnings	Ton-miles
Wisconsin, Express and Intra-Express	Overhead	Ton-miles	Gross earnings	Ton-miles	Gross earnings	Ton-miles

II. Maintenance of Equipment

	24. Superin- tendence	25. Steam Locomotive Repairs	26. Steam Locomotive Renewals	27. Steam Locomotive Depreciation	31. Passenger Car Repairs	32. Passenger Car Renewals	33. Passenger Car Depreciation	34. Fre Car Rej
Whole Line, Freight and Passenger	Overhead	Locomotive perfection sheets		Overhead to 25	Passenger	Passenger	Passenger	Freight
Whole Line, Passenger and Express	Overhead			Overhead to 25	Special	Overhead to	Overhead to	
Whole Line and Wisconsin						Apportion	ned on the basis	of figures f
Wisconsin, Freight and Passenger	Overhead	Locomotive perfection sheets		Overhead to 25	Passenger	Passenger	Passenger	Freight
Wisconsin, Passenger and Express	Overhead	Ton-miles		Overhead to 25	Special	Overhead to	Overhead to	
Wisconsin, Express and Intra-Express	Overhead	Ton-miles		Ton-miles	Ton-miles	Ton-miles	Ton-miles	

IV. Transportation

	61. Superintendence	62. Dispatching Trains	63. Station Employees	64. Weighing and Car Service Associations	65. Coal and Ore Docks	66. Station Supplies and Expenses	67–76. Yard Operation Accounts	80. Road Engine Men
Whole Line, Freight and Passenger	Overhead	Train-hours	Special	Freight	Freight	Special	Arbitrary‡	Locomotive perfection sheets
Whole Line, Passenger and Express	Overhead	Car-miles					Ton-miles§	Ton-miles
Whole Line and Wisconsin								
Wisconsin, Freight and Passenger	Overhead	Train-hours	Special	Freight	Freight	Special	Arbitrary‡	Locomotive perfection sheets
Wisconsin, Passenger and Express	Overhead	Car-miles					Ton-miles§	Ton-miles
Wisconsin, Express and Intra-Express	Overhead	Ton-miles					Ton-miles	Ton-miles

V. General

																TABLE	, 11		
												CHICAGO,	, Milv	WAUKEE &	Sт. Р	'AUL RAIL'	WAY: A	APPORTION	NME)
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1/5	,	4/5	,	9/10		1/10		9/10	Ī	1/10	and	Roadway nd Track	San	nd, Snow, and Ice	8.	Tunnels	Tres C	Bridges, estles, and Culverts	Ü
ings Revenue train-mi	Gros	oss earnings	Rever		-	oss earnings	s Reve	venue rain-miles		ss earnings	Over	erhead to	Rev	venue rain-miles			Gross	s earnings	Gr
ings Ton-miles	Gros	oss earnings	S Ton-n	miles	Gros	oss earnings	Ton	n-miles	Gros	ss earnings	_	erhead to		r-miles			Gross	s earnings	Gr
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ings Revenue train-mil	niles	oss earnings	trai	ain-miles		oss earnings	tra	rain-miles	Gross	ss earnings	over 2-	erhead to		venue rain-miles	<u></u>		Gross	ss earnings	Gr
ings Ton-miles	Gros	oss earnings	Ton-n	miles	Gros	oss earnings	Ton-	ı-miles	Gross	ss earnings	Over	erhead to	Car-	-miles			Gross	ss earnings	s Gr
Ings Ton-miles	Gros	oss earnings	Ton-n	miles	Gros	oss earnings	Ton-	n-miles	Gros	ss earnings		rhead to	Ton-	n-miles			Gross	ss earnings	s Gr
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nger Pass	ssenger	Passenger	r	Freight		Freight		Freight		Overhead 1–23 ar		Overhead 43	d to	Overhead 43	d to	Overhead 25, 31, and 43	, 34,		
al Over	erhead to	Overhead 31	l to .							Overhead 1-23 ar		Overhead 43	d to	Overhead 43	d to	Overhead 25, 31, 43	ıd to		
	Apportio	oned on the l	basis o	of figures for	urnish	ied by the (compa	ny, checke	d and	compared	with s	similar app	ortion	ments for	other s				
enger Pass	ssenger	Passenger	.r	Freight		Freight	!	Freight		Overhead 1-23 ar		Overhead 43	d to	Overhead 43	d to	Overhead 25, 31, and 43	, 34,		
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d 66. Station Supplies an Expenses	and Ope	76. Yard peration ecounts	80. Engir	Road ine Men	_H	Engine House xpenses	R	. Fuel, Road omotives	83. P Locc	Water, Road omotives	R	Lubricants, Road omotives	05.	5. Other upplies	88. Tr	3. Road rainmen	Suppl	. Train plies and epenses	90. To
Special	Arbit	itrary‡	Locom perfe	fection		rhead to 0,82-85	pe	omotive erfection heets		rhead to	peri	omotive erfection eets	per	omotive erfection neets	Specia	ial	Specia	al	Re
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Special	Arbit	itrary‡	perfe	fection			per	rfection	Overh 82		peri	rfection	per	erfection	Speci	ial	Specia	al	Re
	Ton-1	-miles§	Ton-m	niles	Ton-r	miles	Ton-1	miles	Ton-r	miles	Ton-r	miles	Ton-	miles	Speci	ial	Overh 88		Ca
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 	Ton-miles§	Ton-miles	Ton-miles	Ton-miles	Ton-miles	Ton-miles	Ton-mil	les Special	Overhead to 88	Car
	Ton-miles	Ton-miles	Ton-miles	Ton-miles	Ton-miles	Ton-miles	Ton-mil	les Ton-miles	Ton-miles	Tor
v.	General									
			Expen	Salaries and ses, General Office	107. Salaries and Expenses, Clerks and Attendants	108. Genera Supplies Expens		109. Law Expenses	110. Insurance	:

Overhead to 1-105

Whole Line, Freight and Passenger.....

TABLE II

ŀ	MILWAUKEE &	St. Paul Raily	VAY: APPORTION	MENT OF EXPE	ISES
	7. Removal of Sand, Snow, and Ice	8. Tunnels	9. Bridges, Trestles, and Culverts	10. Over- and Underground Crossings	C Fe
•	Revenue train-miles		Gross earnings	Gross earnings	Gro

Gross earnings

Gross earnings

Gross earnings

Gross earnings

46. Shop

Machinery

and Tools

Overhead to

Overhead to

Overhead to

25, 31, 34, and 43

Overhead to 25

31, and 43

88. Road Trainmen

Special

Special

Special

Special

Ton-miles

100. Law Expenses

Overhead to 1-105

89. Train Supplies and Expenses

Overhead to

Special

Special

Overhead to

Ton-miles

110. Insurance

Overhead to 1-105

25, 31, and 4.3

25, 31, 34, and 43

s furnished by the company, checked and compared with similar apportionments for other states, etc

47. Power Plant

Equipment

Car-miles

train-miles

45. Work Equipment

Depreciation

Overhead to

Overhead to

Overhead to

Overhead to

1-23 and 93

4.3

85. Other Supplies

Locomotive

Ton-miles

Locomotive

Ton-miles

Ton-miles

Office

1-105

and

perfection sheets

perfection sheets

ortionments for other states, etc.

43

Car-miles

Ton-miles

ork

nent

vals

d to

d to

d to

d to

ınd 93

dges,	10. Over- and	11. Grade
s, and	Underground	Crossings,
erts	Crossings	Fences, Etc.
-nings	Cross sarnings	Cross samin

Gross earnings

Gross earnings

Gross earnings

Gross earnings

48. Injuries to

Persons

Overhead

Overhead

Overhead

Overhead

90. Block and Tower Signals

train-miles¶

Revenue

Car-miles

of figures furnished by the company, checked and compared with similar apportionments for other states, etc.

Revenue

Car-miles

Ton-miles

train-miles¶

III. Relief

Department

Expenses

12. Snow and Sand Fences, Etc. rossings, nces, Etc. Revenue train-miles oss earnings Gross earnings

Revenue train-miles

Gross earnings

50. Other Expenses

Overhead

Overhead

Overhead

Overhead

92. Draw-Bridge Operations

Gross earnings

Gross earnings

Car-miles

Ton-miles

112. Pensions

Car-miles

Car-miles

Gross earnings

Gross earnings

49. Stationery

and Printing

Overhead

Overhead

Overhead

Overhead

91. Crossing Flagmen and Gatemen

train-miles

Revenue

Car-miles

Revenue

Car-miles

Ton-miles

train-miles

Revenue train-miles Car-miles Car-miles

3. Signals and Interlocking Plants, 3/4

Revenue train-miles

Car-miles

Ton-miles

Gross earnings Gross earnings

51-52. Joint Equipment (Bal.)

Overhead

Overhead

Overhead

Overhead

93. Clearing Wrecks

train-miles

Revenue

Car-miles

Revenue

Car-miles

Ton-miles

113. Stationery

and Printing

Overhead to 1-105

train-miles

3a. Signals and

Interlocking Plants, 1/4

Gross earnings

Gross earnings

Gross earnings

III. Traffic

14. Telegraph and Telephone Lines

Gross earnings

Gross earnings

Gross earnings

Gross earnings

Gross earnings

Whole Line, Freight and Passenger.....

Whole Line, Passenger

Whole Line and Wiscon-

sin

Wisconsin, Freight and Passenger.....

Wisconsin, Passenger and

Wisconsin, Express and Intra-Express....

97. Stationery and Printing

Overhead

Overhead

Overhead

Overhead

Express

94. Telegraph and Telephone

Gross earnings

Gross earnings

Gross earnings

Gross earnings

Gross earnings Overhead

114. Other

Expenses

Overhead to 1-105

and Express...

15. Electric Power Transmission

53. Superin-tendence

a) Expenditures not ma charged and apportion

Apportioned on the bas

states, etc.

Overhead

98. Other Expenses

Overhead

Overhead

Overhead

Overhead

Overhead

115, 116. General Administration, Joint Tracks,

Yards, and Terminals

Overhead to 1-105

Overhead

16. Bui

Fixture

Overhe

Overhe

Overhe

Overhe

Overhe

54. O Age

Gross

Overhe

99. Lo: Dama Frei

Freight

Freight

earn

Signals and erlocking ants, 1/4	14. Telegraph and Telephone Lines	15. Electric Power Transmission	16. Buildings, Fixtures, and Grounds	17. Docks and Wharves	18. Roadway, Tools, and Supplies	19. Injuries to Persons	20. Stationery and Printing	21. Other Expenses	22–23. Joint Yards, Etc. (Bal.)
ss earnings	Gross earnings		Overhead	Freight	Overhead	Overhead	Overhead	Overhead	Overhead
s earnings	Gross earnings		Overhead		Overhead	Overhead	Overhead	Overhead	Overhead
s earnings	Gross earnings		Overhead	Freight	Overhead	Overhead	Overhead		Overhead
s earnings	Gross earnings		Overhead		Overhead	Overhead	Overhead		Overhead
s earnings	Gross earnings		Overhead		Overhead	Overhead	Overhead		Overhead
III. Tra	ffic			Į I			l	1	<u> </u>
		53. Superintendence	54. Outside Agencies	55. Advertising	56. Traffic Association	57. Fast Freight Lines	58. Industrial and Immigration Bureau	59. Stationery and Printing	60. Other Expenses
	Line, Freight and	Overhead	Gross earnings†	Passenger	Gross earnings†		Gross earnings†	Overhead	Overhead
and F	Line, Passenger Express	a) Expenditur charged and	es not made in in apportioned und	er general expens	service. All lega	al, office, and adm	ninistrative expe	nses incurred in	express servi
	Line and Wiscon-	Apportioned or states, etc.	n the basis of fig	gures furnished b	by the company	, checked and c	ompared with s	imilar apportion	ments for oth
	sin, Freight and								
	nger	Overhead	Overhead	Passenger	Gross earnings†		Gross earnings†	Overhead	Overhead
Wiscons	sin, Passenger and	Overhead	Overhead		earnings†	nt. See a) above	earnings†	Overhead	Overhead
Wiscons Expre	sin, Passenger and	Overhead	Overhead		earnings† No apportionmer		earnings†	Overhead	Overhead
Wiscons Expre	sin, Passenger and	Overhead	Overhead		earnings† No apportionmer	at. See a) above	earnings†	Overhead	Overhead
Wiscons Expre	sin, Passenger and	o8. Other Expenses	99. Loss and Damage to Freight		earnings† No apportionmer	at. See a) above	earnings†	I04-5. Operating Joint Tracks and Facilities (Bal.)	
Wiscons Expre	sin, Passenger and sesssin, Express and Express	98. Other	99. Loss and Damage to	roo. Loss and Damage to	earnings† No apportionment No apportionment 101. Damage	nt. See a) above nt. See a) above 102. Damage to Stock on	earnings†	I04-5. Operating Joint Tracks and Facilities	77–78. Opersing Joint Yards and Terminals
Wiscons Expre	sin, Passenger and ess	98. Other Expenses	99. Loss and Damage to Freight	roo. Loss and Damage to Baggage	No apportionmer No apportionmer Tor. Damage to Property Revenue	at. See a) above at. See a) above 102. Damage to Stock on Right of Way Revenue	earnings†	104-5. Operating Joint Tracks and Facilities (Bal.)	77–78. Opers ing Joint Yards and Terminals (Bal.)
Wiscons Expre	sin, Passenger and ess	o8. Other Expenses	99. Loss and Damage to Freight	roo. Loss and Damage to Baggage	earnings† No apportionmer No apportionmer 101. Damage to Property Revenue train-miles¶	nt. See a) above nt. See a) above 102. Damage to Stock on Right of Way Revenue train-miles ¶	earnings† 2. 103. Injuries to Persons Arbitrary	IO4-5. Operating Joint Tracks and Facilities (Bal.) Overhead	77–78. Opering Joint Yards and Terminals (Bal.)
Wiscons Expre	or, Passenger and Express and Express and Printing Overhead Overhead	o8. Other Expenses Overhead Overhead	og. Loss and Damage to Freight	roo. Loss and Damage to Baggage	earnings† No apportionmer No apportionmer TOI. Damage to Property Revenue train-miles ¶ Car-miles	at. See a) above 102. Damage to Stock on Right of Way Revenue train-miles ¶ Car-miles	rog. Injuries to Persons Arbitrary Car-miles	IO4-5. Operating Joint Tracks and Facilities (Bal.) Overhead	77-78. Opering Joint Yards and Termins (Bal.) Arbitrary Car-miles

Overhead to 1-105 Overhead to 1-105

114. Other Expenses 115, 116. General Administration, Joint Tracks, Yards, and Terminals

Wisconsin, Freight and Passenger	Overhead	Revenue train-miles	Gross earnings	Revenue train-miles	Gross earnings	Revenue train-miles
Wisconsin, Passenger and Express	Overhead	Ton-miles	Gross earnings	Ton-miles	Gross earnings	Ton-miles
Wisconsin, Express and Intra-Express	Overhead	Ton-miles	Gross earnings	Ton-miles	Gross earnings	Ton-miles

II. Maintenance of Equipment

	1	1	1			I		
	24. Superintendence	25. Steam Locomotive Repairs	26. Steam Locomotive Renewals	27. Steam Locomotive Depreciation	31. Passenger Car Repairs	32. Passenger Car Renewals	33. Passenger Car Depreciation	34. Frei Car Rep
Whole Line, Freight and Passenger	Overhead	Locomotive perfection sheets		Overhead to 25	Passenger	Passenger	Passenger	Freight
Whole Line, Passenger and Express	Overhead			Overhead to 25	Special	Overhead to	Overhead to	
Whole Line and Wisconsin						Apportion	ned on the basis	of figures fu
Wisconsin, Freight and Passenger	Overhead	Locomotive perfection sheets		Overhead to 25	Passenger	Passenger	Passenger	Freight
Wisconsin, Passenger and Express	Overhead	Ton-miles		Overhead to 25	Special	Overhead to	Overhead to	
Wisconsin, Express and Intra-Express	Overhead	Ton-miles		Ton-miles	Ton-miles	Ton-miles	Ton-miles	

IV. Transportation

	61. Superin- tendence	62. Dispatching Trains	63. Station Employees	64. Weighing and Car Service Associations	65. Coal and Ore Docks	66. Station Supplies and Expenses	67-76. Yard Operation Accounts	80. Road Engine Men
Whole Line, Freight and Passenger	Overhead	Train-hours	Special	Freight	Freight	Special	Arbitrary‡	Locomotive perfection sheets
Whole Line, Pas- senger and Express	Overhead	Car-miles					Ton-miles§	Ton-miles
Whole Line and Wisconsin								
Wisconsin, Freight and Passenger	Overhead	Train-hours	Special	Freight	Freight	Special	Arbitrary‡	Locomotive perfection sheets
Wisconsin, Passenger and Express	Overhead	Car-miles		•••••			Ton-miles§	Ton-miles
Wisconsin, Express and Intra-Express	Overhead	Ton-miles					Ton-miles	Ton-miles

V. General

Whole Line, Freight and Passenger...
Whole Line, Passenger and Express...
Whole Line and Wisconsin.....

Wisconsin, Freight and Passenger Wisconsin, Passenger and Express

Wisconsin, Express and Intra-Express

^{*} In accounts 2, 3, 4, 5, and 13, the

[†] Exclusive of mail and express. ‡ Arbitrary and switching mileage.

[§] Express car.

[¶] Exclusive of switching.

		Ap	portione	ed on the	basis o	of figures f	urnishe	ed by the	compar	ny, checke	ed and	compared	with s	imilar app	ortion	nents for	other s	tates, etc.			
seng	er	Passenge	er	Passenge	er	Freight		Freight		Freight		Overhea 1–23 a	nd to and 93	Overhea 43	d to	Overhea 43	d to	Overhea 25, 31 and 43			
cial		Overhea 31	d to	Overhea 31	d to							Overhea 1–23 a	nd to and 93	Overhea 1–23 a		Overhea		Overhead 31, an			
-mil	es	Ton-mile	es	Ton-mile	es		••••														
														The state of the s							
nd ks	Suppl	Station lies and penses	Oper	5. Yard ration ounts		Road ine Men	Н	Engine louse penses	R	Fuel, Road motives	83. R Loco	Water, Road motives	R	ubricants, Road omotives	85. Su	Other pplies		Road inmen	Suppl	Train lies and benses	90. Tov
	Specia	ıl	Arbitr	ary‡		motive fection eets		nead to 82-85	pe	motive erfection leets		head to 82	per	motive rfection eets	per	motive fection ets	Specia	al	Specia	ıl	Rev t
			Ton-m	ıiles§	Ton-n	niles	Ton-n	niles	Ton-r	niles	Ton-n	niles	Ton-r	miles	Ton-	miles	Specia	al	Overh 88	ead to	Car
												Apportion	ned on	the basis o	of figur	es furnish	ed by t	he compa	ny, chec	ked and	comp
	Specia	.l	Arbitr	ary‡		motive fection ets		nead to 82-85		notive fection ets	Overh 82	head to		motive rfection eets	Locor per she	notive fection ets	Specia	al	Specia	ıl	Rev t
			Ton-m	ıiles§	Ton-n	niles	Ton-n	niles	Ton-n	niles	Ton-n	niles	Ton-r	miles	Ton-	miles	Specia	al	Overh 88	ead to	Car
			Ton-m	iles	Ton-n	niles	Ton-n	niles	Ton-n	niles	Ton-n	niles	Ton-r	miles	Ton-	miles	Ton-m	iles	Ton-m	niles	Tor
		v. (General	1						,											

107. Salaries and Expenses, Clerks and Attendants

Overhead to 1-105

108. General Office Supplies and Expenses

Overhead to 1-105

109. Law Expenses

Overhead to 1-105

Overhead to 1-105

Apportioned on the basis of figures furnished by the company, checke

Overhead to 1-105

Overhead to 1-105

Overhead to 1-105

110. Insurance

Overhead to 1-105

Overhead to 1-105

106. Salaries and Expenses, General Office

Overhead to 1-105

* In accounts 2, 3, 4, 5, and 13, the first fraction represents "wear," the second "weather."

Whole Line, Freight and Passenger...

Whole Line and Wisconsin.....

Whole Line, Passenger and Express.....

Wisconsin, Freight and Passenger

Wisconsin, Express and Intra-Express

Wisconsin, Passenger and Express

nings Revenue

nings

nings

Passenger r Repairs

senger

cial

train-miles

32. Passenger Car Renewals

Passenger

Overhead to

Ton-miles

Ton-miles

Gross earnings

Gross earnings

Gross earnings

33. Passenger Car

Depreciation

Passenger

Overhead to

Revenue

Ton-miles

train-miles

34. Freight Car Repairs

Freight

Gross earnings

Gross earnings

Gross earnings

35. Freight Car Renewals

Freight

Revenue train-miles

Ton-miles

Ton-miles

36. Freight Car

Depreciation

Freight

Gross earnings

Gross earnings

Gross earnings

43. Work Equipment Repairs

Overhead† to

Overhead† to

1-23 and 93

1-23 and 93

Overhead to

Overhead to

Overhead to

44. Work Equipment

Renewals

Overhead to

Overhead to

43

43

2-5

Revenue

Car-miles

Ton-miles

train-miles

45. Work Equipment Depreciation

Overhead to

Overhead to

43

Gross earnings Gro

Gro

Gro

47. Power Plant

Equipment

Gross earnings

Gross earnings

46. Shop Machinery and Tools

Overhead to

Overhead to

25, 31, and

25, 31, 34, and 43

[†] Exclusive of mail and express. ‡ Arbitrary and switching mileage.

[§] Express car.

[¶] Exclusive of switching.

Rever trai	nue in-miles			Gross	earnings	Gross e	earnings	Gross	earnings		nue in-miles	Reve	enue nin-miles	Gros	s earnings	Gross e	earnings		Overhe
Car-n	niles			Gross	earnings	Gross e	earnings	Gross	earnings	Car-n	niles	Car-ı	miles	Gros	s earnings	Gross e	earnings		Overhe
Ton-r	miles			Gross	earnings	Gross 6	earnings	Gross	earnings	Gross	s earning	Ton-	miles	Gros	s earnings	Gross e	earnings		Overhe
		<u>'</u>			'.							,			III. Tra	ffic			
ork nent vals	45. Wo Equipm Deprecia	nent	46. Sh Machin and To	nery	47. Pow Plant Equipm	t 4	18. Injur Perso		49. Stati and Prin		50. O Expe	ther nses	51-52. Equipn (Bal	nent				53. Superintendence	54. C
d to	Overhead 43	d to	Overhead 25, 31, and 43				Overhead	i	Overhead	d	Overhe	ad	Overhea	d		ine, Fre		Overhead	Gross earn
d to	Overhead 43	d to	Overhead 25, 31, 43				Overhead	1	Overhead	d	Overhe	ad	Overhea	đ		ine, Pas xpress		a) Expenditure charged and	
ortionm	nents for o	other st	ates, etc.													ine and		Apportioned or states, etc.	the bas
d to	Overhead 43	i to	Overhead 25, 31, and 43				Overhead	i	Overhead	d	Overhea	ad	Overhead	i		in, Freig		Overhead	Overhe
d to and 93	Overhead 1-23 a		Overhead 31, and				Overhead	i	Overhead	d	Overhea	ad	Overhead	1		in, Passer			
																in, Expre Express.			
85. Sup	Other oplies		Road nmen	89. Suppl Exp	Train lies and enses	90. Blo Tower S	ck and Signals	Flagm	rossing ien and emen	Bı	Draw- ridge rations	93. W	Clearing /recks	94. T and T	Telegraph Telephone	97. Stat and Pr		98. Other Expenses	99. Lo Dama Frei
perf	Locomotive perfection sheets		1	Special		Revenue R train-miles¶		Revenue train-miles		Gross earning			enue in-miles	Gros	s earnings	Overhe	ad	Overhead	Freight
Ton-m	niles	Specia	1	Overhead to Car		Car-mil	Car-miles Car-m		niles Car-mile		niles	Car-1	miles	Gros	s earnings	Overhe	ad	Overhead	
of figure	s furnishe	ed by th	e compar	nv. chec	ked and co	ompare	d with si	milar aı	pportionr	ments f	or other	states, e	etc.						
Locom	notive ection	Specia	1	Specia		Revenu		Reven			s earnings	Reve		Gros	s earnings	Overhe	ad	Overhead	Freight
Ton-m	niles	Specia	1	Overhe 88	ead to	Car-mi	les	Car-m	iles	Car-n	niles	Car-1	miles	Gros	s earnings	Overhe	ad	Overhead	
Ton-m	niles	Ton-mi	les	Ton-m	iiles	Ton-mi	iles	Ton-m	iles	Ton-r	miles	Ton-	-miles	Gros	s earnings	Overhe	ad	Overhead	
Office and es	109. La	ıw Expe	enses	110. Ir	nsurance	1	111. Rel Departm Expens	ief ent es	112.	. Pensi	ons	113.	Stationery Printing		114. Ot Expens	her es	Adm Joi Ya	16. General inistration, nt Tracks, and erminals	
1-105	Overhea	ad to 1-	-105 O	verhead	l to 1–105	<u> </u>						Overhe	ad to 1-10	_ _	verhead to			ead to 1-105	
1-105	Overhea		- 1			.							hon -+-+	!	verhead to	1-105	Overh	ead to 1-105	
the bas	Overhea				npany, che l to 1-105	cked ar	nd compa	red wit	n similar	apport		5 10r ot	ner states,		verhead to	1-105	Overh	ead to 1-105	
1-105	Overhea					-								o	verhead to	1-105	Overh	ead to 1-105	
	Overhea	ad to 1-	105			-								о	verhead to	1-105	Overh	ead to 1-105	

oss earnings	Gross earni	ngs	. Overhead	Freight	Overhead	Overhead	Overhead		Overhead
oss earnings	Gross earni	ngs	Overhead		Overhead	Overhead	Overhead		Overhead
oss earnings	Gross earni	ngs	Overhead		Overhead	Overhead	Overhead		Overhead
III. Tra	ffic	·				1	<u> </u>	<u> </u>	<u>'</u>
t		53. Superintendence	54. Outside Agencies	55. Advertising	56. Traffic Association	57. Fast Freight Lines	58. Industrial and Immigration Bureau	59. Stationery and Printing	60. Other Expenses
	Line, Freight		Gross earnings†	Passenger	Gross earnings†		Gross earnings†	Overhead	Overhead
	Line, Passenge Express	a) Expenditu	res not made in in l apportioned und	nterest of express ler general expens	service. All lega	al, office, and adr	ninistrative expe	enses incurred in	express service
	Line and Wise		on the basis of fig	gures furnished l	by the company	, checked and c	ompared with s	imilar apportion	ments for other
	in, Freight a		Overhead	Passenger	Gross earnings†		Gross earnings†	Overhead	Overhead
	in, Passenger			:	No apportionmen				
	in, Express a Express				No apportionmen	÷.			
	1900								
Telegraph Telephone	97. Statione and Printin		99. Loss and Damage to Freight	100. Loss and Damage to Baggage	101. Damage to Property	102. Damage to Stock on Right of Way	103. Injuries to Persons	ing Joint ing Joint Tracks and Facilities (Bal.)	77-78. Operat- ing Joint Yards and Terminals (Bal.)
oss earnings	Overhead	Overhead	Freight	Passenger	Revenue train-miles¶	Revenue train-miles¶	Arbitrary	Overhead	Arbitrary
oss earnings	Overhead	Overhead			Car-miles	Car-miles	Car-miles	Overhead	Car-miles
oss earnings	Overhead	Overhead	Freight	Passenger	Revenue train-miles ¶	Revenue train-miles	Arbitrary	Overhead	Overhead
oss earnings	Overhead	Overhead			Car-miles	Car-miles	Car-miles	Overhead	Car-miles
oss earnings	Overhead	Overhead			Ton-miles	Ton-miles	Ton-miles	Overhead	Ton-miles
114. Ot Expens		5, 116. General dministration, Joint Tracks, Yards, and Terminals							
Overhead to	1-105 Ov	erhead to 1-105							
Overhead to	0v	erhead to 1-105							

Overhead to 1-105

not be questioned, it did not follow that 55 per cent would be the proper amount in intrastate business. Revenues on intrastate business amounted to \$355,611.14.

Now, an analysis of the expense accounts and the operations they represent revealed the fact that in the great majority of cases it was possible to separate the costs and to attribute them directly to the specific services performed as the shipments passed from consignor to consignee; in other words, that there was a fixed minimum cost applying to every shipment in each of its several stages of transportation. There was, for example, an initial expense for every shipment, which was practically the same whether the shipment weighed ten pounds or one hundred pounds and whether it traveled fifty miles or five hundred miles. Such services as weighing, receipting, way-billing, entering into accounts, and tracing in case of loss would be practically the same, regardless of weight or distance. This is also true of wagon service, though with important limitations. These costs clearly include the greater part of the express company expenses and only a small part of the railroad expenses, and the unit for costs of this kind is the shipment.

In addition to shipment costs there are also elements of cost which vary almost exclusively with weight. Weight evidently exerts a great influence upon cost in pick-up and delivery service and in handling shipments at stations and at transfer points. Both shipment costs and weight costs are largely terminal costs, and they make up a considerable portion of the express company expenses and a smaller portion of the railroad expenses. The unit here is the pound, or more conveniently the hundredweight.

The third element of cost varies with the distance the shipment moves. The element of weight is also a factor here and so this is more accurately called the weight-distance cost, representing the product of weight and distance. Naturally most of the railroad items come under this head. A small number of railroad expenses are, of course, independent of distance, and these are included in the specific costs attributed to shipment and weight. On the other hand, a few of the express company costs, such as transfer and messenger service, are influenced by length of haul, and these are accordingly included in movement costs. The commodity which the railroad is conceived as furnishing is in reality ton-miles, or

cubic-foot-miles; that is, "it moves cars containing a certain number of pounds or cubic feet of express matter a certain number of miles." It is probable that in the particular traffic which characterizes the express business size really affects movement cost more than does actual weight. Nevertheless weight may be accepted, with certain reservations, as a measure of space, and the unit of weight-distance cost thus becomes the pound-mile, or more conveniently the hundredweight-mile.

The foregoing are, to be sure, not the only cost elements in the express business. Other considerations affect the case, but they are of relatively small importance. The most important of these considerations are number of packages, risk, and size. Proper rules of aggregating cover any inequalities that may arise in connection with the number of packages. Risk is partly accounted for in weight and distance costs, and extraordinary conditions in this respect may be met by higher classifications. Size probably plays a greater part in cost than does actual weight, but weight is at any rate a rough measure of size, and for extremely bulky articles recourse may be had again to classification. In the great majority of cases, however, the three elements to be considered are shipment cost, weight cost, and weight-distance cost.

The problem, therefore, of constructing a schedule of rates running to the services in which the costs were incurred, resolved itself into a separation of the various expense accounts into the three costs named above and a determination of the number of shipment units, weight units, and weight-distance units represented in the Wisconsin business. This process, like that of apportioning expenses along the various lines of railway and express service, involved a vast amount of study and a multitude of considerations whose details must be omitted or else barely touched upon here.

For the purpose of deriving these costs the calculations were made to include the entire Wisconsin business, instead of the intrastate business alone. The reason for this was that the major portion of the Wisconsin costs were actual allocations, while the intrastate costs were, in the main, apportionments, and that the total Wisconsin costs were given in a manner better suited to cost-analysis purposes. Wisconsin costs included the terminal costs of intrastate and interstate business and the movement costs of intra-

state, interstate, and transstate business. The reduction of total costs to unit costs thus consisted in reducing the number of shipment units handled in Wisconsin to two-handling equivalents, to represent complete transactions, and in relating to them the total weight-distance units.

In order to separate these costs into their constituent elements, expense accounts were analyzed and arranged in groups, and the division then effected, in each instance, after a careful study of the operations involved and a relation of these operations to the number of shipments, to the weight of shipments, and to the product of the weight of the shipments and the distance they traveled. This involved the consideration and appraisal of a number of conflicting details such as the inclusion of money-order business and other non-express operations, the proportion of weight costs attributable to pick-up and delivery and again to actual movement, the railroad cost element in shipment and weight expenses, the express cost element in movement expenses, etc. The grouping of the expenses and the percentages of these expenses attributed to each of the cost items were as follows:

Shipment Weight Weight-Distance A. Express company costs— Per Cent Per Cent Per Cent Agency and office expenses ... 71 9.0 Wagon and stable..... 0.0 70 30 Transfer and train..... 21.4 57.2 21.4 Other expenses..... 60.7 16.0 23.3 16.0 Taxes...... 60.7 23.3 Return on investment..... 60.7 23.3 16.0 B. Common carrier costs..... 3.0 95.0 35.66 Total costs..... 14.0 50.3

TABLE III

Total express company costs were thus divided as follows: shipment, \$238,994; weight, \$91,640; weight-distance, \$62,936. Common carrier costs were: shipment, \$9,063; weight, \$6,042; weight-distance, \$287,001. Combining the two gives the following distribution of the total costs of \$695,676: shipment, \$248,057; weight, \$97,682; weight-distance, \$349,937.

The total Wisconsin expenses having been distributed among shipment costs, weight costs, and weight-distance costs, the next

step was to determine the total number of shipment, weight, and movement units in the Wisconsin business. This was done separately for merchandise and "special" business.

The total number of shipment units was computed from shipment handlings for the fiscal year ending June 30, 1910. These last were based upon the number of waybills in Wisconsin business, estimated by applying the average charge per waybill as found by actual check for the months of June, July, and August, 1910, to the total charges for the year in question.

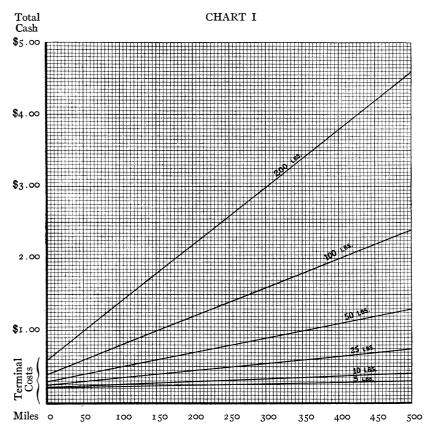
Weight units and weight-distance units were calculated separately for intrastate, interstate, and transstate business. In order to find the number of pounds and hundredweight miles of intrastate shipments an actual check of the largest agencies in the state was made for three days, and the average number of pounds per dollar and the average pound-mile per dollar thus obtained were applied to the total intrastate revenue for the year. These results were then averaged with results derived by applying the average pounds per shipment and the average length of haul to the total intrastate business for the year. Interstate units were derived in a similar way, except that the charges on interstate shipments were divided by two in order to place the shipments on a twohandling basis. Hundredweight-miles for transstate business were obtained by ascertaining the hundredweight-miles of this class of business for one week and calculating from this the business for the year. There were, of course, no terminal costs here and hence no shipment units or weight units. The number of shipments and the number of pounds thus include intrastate and interstate shipments, and hundredweight-miles include intrastate, interstate, and transstate shipments.

The total number of units in Wisconsin business were thus ascertained to be: shipment, 1,307,027; weight, 53,371,831; weight-distance, 94,392,654. By applying these figures to the total costs already shown the following separate costs were obtained:

Shipment18.95 cents per shipment Weight..... o. 1830 cent per pound

Weight-distance..... 0.3707 cent per hundredweight-mile

The foregoing figures are based upon the assumption that merchandise and "special" business were equally costly to handle. The conditions under which the "special" business was handled, however, were such as to warrant the conclusion that this business



is handled at smaller cost than the regular merchandise business. Calculations were made showing unit costs under various assumptions as to the percentage relation of the costs on special business to the costs on merchandise business, the figures varying from those given in the preceding paragraph to 21.41 cents per shipment and 0.2172 cent per pound. It seemed best, therefore, to use the nearest even figures in the construction of a tentative schedule. How the charges would run under the proposed system can be

seen from Table IV.¹ The general trend of a system of rates worked out on this basis is shown in Chart I. The fact should be kept in mind that both Table IV and the chart represent charges based upon fixed unit costs, without reference to practical considerations in connection with classification, distance, etc.

TABLE IV

Cost, in Cents, of Express Shipments, Classified by Weight of Package and by Distance

						Weight o	F PACKAG	E	
				5 Lbs.	10 Lbs.	25 Lbs.	50 Lbs.	100 Lbs.	200 Lbs.
20 cents pe	r shipi	nent		20	20	20	20	20	20
o. 2 cent pe	r pour	d		I	2	5	10	20	40
Total ter	minal	cost	s	21	22	25	30	40	60
Moveme	nt cost	, 10	miles	0.2	0.4	ĭ	2	4	8
Total cos	t. 10	mile	s	21.2	22.4	26	32	44	68
" "		"		21.4	22.8	27	34	48	76
" "	50	"		22	24	30	40	60	100
" "	100	"		23	26	35	50	80	140
" "	150	"		24	28	40	60	100	180
" "	200	"		25	30	45	70	120	220
" "	300	"		27	34	55	90	160	300
" "		"		20	38	65	IÍO .	200	380
" "		"		31	42	75	130	240	460

The records of the case contain many impressive facts concerning the incidence and amount of express charges in general, and concerning express practices in Wisconsin in particular. These facts have their place and uses, and their importance is not to be overlooked. The significant thing in the investigation, however, is the theoretical bearing it assumes through its consistent application of the cost principle and the apparent dependability of its results. It does not offer a complete solution of the problem of cost apportionment in the transportation service, but it does represent an important step in this direction; and without minimizing the exceptional difficulties that attend this cost separation, it shows that the task is neither so elusive nor so impossible of accomplishment as many authorities have been inclined to believe.

ROBERT H. TUCKER

University of Wisconsin

¹ Made up from a similar table in the Opinion of the Commission, p. 39.